

Aedes (Finlaya) reinerti, a New Species from Northern Thailand Related to
Aedes (Finlaya) formosensis Yamada
(Diptera: Culicidae)

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ABSTRACT. The adults, larva, pupa, male and female genitalia are described and illustrated for *Aedes (Finlaya) reinerti*, a new species from northern Thailand, and are compared with a related species, *Aedes (Finlaya) formosensis*. The bionomics and distribution of the new species are discussed. Lectotypes are designated for *Aedes formosensis* and *Finlaya khasiana*.

INTRODUCTION. In June-July, 1978 the Department of Medical Entomology, Armed Forces Research Institute of Medical Sciences (AFRIMS), Bangkok, Thailand, conducted mosquito taxonomic surveys on the tallest mountain in Thailand, Doi Inthanon in Chiang Mai Province. During this trip specimens of an *Aedes (Finlaya)* species were collected and reared which were initially determined as *Ae. (Fin.) formosensis* Yamada 1921, originally described from Formosa (Taiwan). Later, characters were noted on several stages of these specimens which made us suspect that they represented an undescribed species or a previously described species that was currently considered a synonym of *Ae. formosensis*. An examination of specimens at AFRIMS collected in Chiang Mai in the 1960s revealed additional specimens with the same distinctive characters, and in 1982-83 the junior author found additional specimens from the 1960s housed in the Smithsonian collections at the National Museum of Natural History (USNM).

There are 2 synonyms listed under *Ae. formosensis* in Knight and Stone (1977), i.e., *Aedes pallirostris* Edwards, 1922 and *Finlaya khasiana* Barraud, 1923. The latter was synonymized under *Ae. formosensis* by Barraud (1934), while Knight (1968) synonymized the former with *Ae. formosensis*. The holotype of *pallirostris* and syntypes of *khasiana* are housed in the British Museum (Natural History) and were examined during this study. The syntypes of *Ae. formosensis* were also examined during this study. These specimens were formerly housed in the Medical Zoology Laboratory, Institute for Infectious Diseases, University of Tokyo, but are now located in the Department of Parasitology, Institute of Medical Sciences, University of Tokyo.

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Based on our study of all of the above specimens and thousands of *Ae. formosensis* specimens in the USNM and at AFRIMS from all over the Southeast Asian faunal region, the differences found on the northern Thai specimens remain valid and indicative of a new species. Accordingly, we take this opportunity to describe and name this new species below.

The terminology used follows Harbach and Knight (1980) and Wood et al. (1979), except the width of the siphon was measured at the base rather than at the middle of the siphon, and the width of the trumpet was measured at the base of the pinna rather than midlength of the trumpet.

Aedes (Finlaya) reinerti, new species
(Figures 1-5)

Aedes (Finlaya) formosensis of Knight 1968: 10 (in part)

Adults of *reinerti* can be identified by having the combination of pale scales on the paratergite and an anterior longitudinal white line nearly the entire length of the midfemur. The larva is very distinct for the subgroup by having an unusual 1-C. The pupa is easily recognized by having a short seta 5-VI, VII and a short seta 1 on the paddle.

FEMALE. (Figs. 1,2) **Head.** Antenna dark brown, 0.79-0.88 length of proboscis; flagellomere 1 with mesal and lateral patches of broad spatulate dark brown scales; pedicel light brown with patch of dark spatulate scales mesally, occasionally few pale scales intermixed; clypeus dark, bare; maxillary palpus dark scaled, with pale scales at apex of segments 3-4, 0.19-0.30 length of proboscis; proboscis dark scaled dorsally, with longitudinal stripe of pale scales from near base to apex on venter, with pale scales visible laterally on midportion, 0.81-1.12 length of forefemur; occiput with decumbent pale falcate scales, pale scales extending forward to vertex as narrow dorsomedian line, with numerous erect dark forked scales extending forward to vertex except on dorsomedian pale line, several erect pale forked scales may be present; vertex with large dorsal submedian patches of decumbent dark spatulate scales, with creamy falcate ocular scales and white spatulate scales lateral to dorsal submedian dark patches, with small lateral dark patches of spatulate scales adjacent to ocular line; remainder of vertex, postgena and gena with spatulate pale scales; interocular spaces with pale falcate scales; interocular setae pale yellow, ocular setae dark brown. **Thorax.** Scutal integument reddish brown; scutal scales narrow and falcate, in pattern of pale lines on dark background; anterior and lateral promontory with pale falcate scales. Scutal color pattern formed by pale creamy scales in narrow lines as follows: acrostichal line extending posteriorly and forked to enclose the prescutellar area; anterior outer dorsocentral line extending posteriorly and ending at or beyond the angle of outer posterior dorsocentral line; outer posterior dorsocentral line curved outward toward scutal angle on anterior end and

reaching scutal angle; postsutural supramarginal line extending posteriorly from near scutal angle to parascutellum; supraalar pale scales present, more cephalic scales sparse, broad and falcate, more caudal scales in thick patch over wing root, long and linear; scutal setae as follows: acrostichal setae sparse, extending posteriorly approximately half of distance to fork, most anterior setae pale yellow, more posterior setae dark brown; posterior medial setae absent; dorsocentral setae abundant, lateral to anterior outer dorsocentral pale line, mesal to posterior outer dorsocentral pale line, 1-3 setae pale yellow on lateral promontory, remaining dorsocentral setae dark brown; lateral and posterior scutal fossal, antealar and supraalar setae present and dark brown, median scutal fossal setae absent; parascutellum with single dark seta; scutellum with spatulate scales on all 3 lobes, median lobe with patch of pale scales separating lateral dark scales, lateral lobes with dark scales, occasionally with several pale scales, median lobe with 4-6 long, 0-5 short, light to dark brown setae, lateral lobes each with 5-8 long, 2-3 short dark brown setae, pleural integument dark brown; antepnotum covered with broad white spatulate scales and dark brown setae; postpronotum largely covered with broad white spatulate scales, occasionally few falcate scales dorsally and sometimes median patch of broad dark spatulate scales intermixed with white narrow to broad spatulate scales, 1-6 dark brown setae; white spatulate scales on paratergite, proepisternum, postspiracular area, subspiracular area, lower prealar knob, upper and lower mesokatepisternum and mesepimeron; pleural setae pale, 5-10 long, 0-4 short on proepisternum, 3-9 postspiracular, 10-12 prealar, 5-10 upper and 2-5 long, 0-4 short on lower mesokatepisternum and 8-18 on upper mesepimeron. **Legs.** Forecoxa with patch of white spatulate scales anteriorly and dorsad of dark spatulate scales or with patch of dark scales in between patches of white scales; midcoxa with white spatulate scales anteriorly and dorsad of dark spatulate scales, with small upper lateral patch of white spatulate scales; hindcoxa with white spatulate scales on anterior and dorsal portions; trochanter pale scaled; forefemur with narrow longitudinal white line along anteroventral surface of basal 0.90-0.95 and broader line along posterior surface from base to apex; midfemur with narrow white line along anterior and broader pale line along posterior surfaces from near base to apex, usually interrupted at 0.60-0.70 level from base, with broad white patch posteriorly from near base out to 0.60-0.70 level from base, then narrowing to white line to near apex; hindfemur with broad anterior white patch from near base to near apex; foretibia dark with long narrow white line posteroventrally, apex with small white patch, midtibia with narrow white line on anterior surface from 0.24-0.40 level from base, with long narrow white line on posterior for nearly entire length, hindtibia with narrow white line on anteroventral surface from 0.25-0.40 level from base; foretarsomeres 1 and 2, mid- and hindtarsomeres 1-3 with basal white bands or dorsal patches; foretarsomeres 3-5, mid- and hindtarsomeres 4 and 5 completely dark; posttarsus with 2 ungues, fore- and midtarsi with ungues equal, each with basal tooth, hind ungues simple. **Wing.** dark scaled, venter of costa with well defined pale line basal to humeral crossvein, often reaching humeral crossvein. **Halter.** Scabellum pale without scales, pedicel with dark scales on anterior margin near capitellum, capitellum with dark scales apicomically and white scales apicolaterally. **Abdomen.** Terga dark scaled, patches of white scales basolateral on I-VII and basomedially on II-IV or more segments; sterna dark brown scaled, with basal white bands on terga

III-VII. Genitalia (Fig. 3) Tergum VIII lightly pigmented, rounded, with short setae on apical margin; sternum VIII slightly concave apically, with numerous short setae on apical 0.20, setae confined primarily to median area on basal 0.80, few short setae scattered laterally; tergum IX moderately pigmented as long as wide, apical margin strongly emarginate, with well developed lateral lobes, each with 8-10 setae; upper (UVL) and lower vaginal (LVL) lips pigmented, narrow, covered with minute spicules; insula (I) pigmented, shorter than wide, entire area covered with minute spicules, with 6-7 small setae on each submedian anterior lobe; postgenital lobe (PGL) with apical margin truncate, entirely covered with minute spicules, scattered short setae on apical 0.33, basal median apodeme (BMA) light pigmented; cercus (Ce) as long as postgenital lobe, apex rounded, dorsal surface covered with minute spicules, short and moderately long setae scattered over apical 0.50; 1 large and 2 smaller spermathecal capsule (Sca); accessory gland duct base (AGDB) light pigmented.

MALE. (Figs. 1,2,4) In general similar to female but with the following differences. **Head.** Antenna dark brown, 0.59-0.90 length of proboscis; pedicel pale brown without patch of dark brown scales mesally; maxillary palpus 0.80-1.00 length of proboscis, with basal white bands or ventral patches on segments 3-5; proboscis with narrow dorsal band of white scales on 0.45-0.61 and ventrally with broad pale stripe from this band to apex, 0.81-1.00 length of forefemur. **Legs.** Posttarsi of fore- and midlegs with unguis unequal in size, each with basal tooth, hindunguis simple. **Genitalia.** Tergum IX not pigmented, bilobed, each lobe with 5-10 setae; sternum IX with 3-6 setae arranged in single or irregular rows; gonocoxite long and moderately broad, tergum with short fine setae extending to mesal margin, scales on lateral and sternum, tergum and sternum with long stout setae, basal mesal area with a patch of short fine setae; gonostylus moderately long and narrow, 0.50-0.65 length of gonocoxite, with spicules on basal 0.35-0.50, 2-3 short fine setae near apex; gonostylar claw short, 0.23-0.38 length of gonostylus; claspette stem densely spiculate with 2-6 short setae mesally, filament simple, evenly arcuate and tapered distally, as long as stem; phallosome with aedeagus (Ae) elliptic with broad opening on basal 0.65 of tergum, sternum with broad opening on apical 0.60 and with median fine point apically; paraproct apex dark with a single apical tooth; 2-4 cercal setae.

PUPA. (Fig. 4) The placement, development, length and branching of setae as figured; range and modal number of branches listed in Table 2. **Cephalothorax.** Trumpet moderately pigmented, trumpet length 0.51-0.70 mm, width 0.14-0.23 mm, index 2.75-4.33, mean 3.52; pinna long, on apical 0.49-0.72, mode 0.58, seta 1-CT usually single or, forked; 2-CT single or double; 3-CT single to 3 branches; 4-CT single to 7 branches; 5-CT single to 8 branches; 9-CT single to 3 branches. **Abdomen.** Moderately pigmented; seta 1-I fanlike with aciculate dendritic branches, with 4-12 basal branches before secondary branching, mode 7; 2-I-VII short, single or double; 3-I-III long, single, 3-IV-VII short, single to 5 branches; 4-I-VI with 2-6 branches, 4-VII single to 4 branches; 5-I-III short, single to 6 branches; 5-IV single, longer than segment V; 5-V single, approximately 0.5-1.0 length of segment VI, 5-VI, VII usually short, single, 0.61 or less length of succeeding segment, mode 0.45; 6-I-VII single to 4 branches; 7-I-II long, single to 4 branches, 7-III-VII short, single to 6 branches; 8-II single to 3 branches, 8-

III-VII single to 6 branches; 9-I-VI short, single, 9-VII with 3-8 branches; 10-I-VII single to 3 branches; 11-I-VII short, single; 0, 14-II-VIII minute, single; 4-VIII single to 3 branches; 9-VIII with 6-13 branches. **Paddle.** Apex rounded, shallowly emarginate, outer and inner margins with numerous spicules from basal 0.15-0.20 of outer margin; seta 1-P short, 0.17-0.36 length of paddle, usually single to forked, (bifid or branch tipped) attached apically; paddle length 0.67-0.83, width 0.67-0.90 mm, index 0.92-1.07, mean 0.98.

LARVA. (Fig. 5). The placement, development, length and branching of setae as figured; range and modal number of branches listed in Table 3. **Head.** Width 0.90-1.05 mm; seta 1-C long, stout, divided on basal 0.16-0.46 (occasionally single or trifid), each branch with long fine barbs, or with brushy tip, 0.20-0.60 mm; 4-6-C cephalad of 7-C level; 4-C with 3-10 branches; 5-C with 17-34 branches; 6-C with 6-16 branches; 7-C with 4-7 branches; 8, 9, 10, 12, 13, 14-C single or double; 11-C with 5-13 branches; 15-C with 2-6 branches; 6-Mx single, stout, equal length of 14-C, dorsomentum with 10-13 teeth or either side of median tooth. **Antenna.** Moderately long, 0.28-0.35 mm, with short spicules scattered over entire shaft, 1-A with 2-8 branches, attached 0.52-0.76 from base of antenna; 2-6-A attached at apex of antennal shaft. **Thorax.** Prothorax: 0-P with 5-8 branches; 1-P with 2-4 branches; 2, 4, 6, 9, 10-12-P single, occasionally double; 3-P with 9-16 branches; 5, 7, 11-P double or triple; 8-P with 2-4 branches; 14-P with 2-4 branches. Mesothorax: 1-M with 2-7 branches; 2-M usually double; 3-5, 7, 10-12-M single; 6, 8, 9-M with 3-7 branches; 14-M with 2-11 branches; Metathorax: 1-T with 2-5 branches; 2, 5, 6, 10-12-T single; 3, 4, 8, 9-T with 2-5 branches; 7-T with 4-10 branches; 13-T with 3-6 branches. **Abdomen.** Setae 1, 2, 6, 7, 9 and 13 stouter than the others, 7, 13 occasionally slender; 1-I-VII with 2-8 branches; 2-I-VII single or double; 3-I-VI single; 3-VII with 2-4 branches; 4-I-VII single to 4 branches; 5-I-VII with 2-7 branches; 6-I-VII with 2-4 branches; 7-I, II, VII usually single, 7-III-VI single to 3 branches; 8-II-VI single to 3 branches; 8-VII with 2-5 branches; 9-I with 2-3 branches; 9-II-VI single, 9-VII single to 3 branches, 9-II-VI stronger than 9-I and VII; 10-I-VII usually single; 11-I with 2-6 branches; 11-II-VII single or double; 12-I-VII single to 3 branches; 13-I, II, VI small with 2-7 branches, 13-III-V stouter with 2-4 branches, 13-VII single; 1-VIII double or triple, 2 and 4-VIII single; 3-VIII with 6-9 branches; 5-VIII with 2-4 branches; comb of 30-74 scales, each with strong median apical spine and smaller lateral spines diminishing basally into fine lateral spicules; siphon pigmented, dorsal length 0.65-0.90 mm, width 0.30-0.51 mm, index 1.57-2.56, mean 1.88; acus well developed; pecten of 10-17 spines attached on basal 0.50-0.72, spines simple or with fine short denticles on basal 0.50, usually 1-2 attached even with or beyond insertion of 1-S; 1-S single to 3 branches attached on basal 0.50-0.61 of siphon; segment X with saddle moderately pigmented, incomplete, with strong simple spicules on caudal margin, dorsal length 0.35-0.40 mm; 1-X single, long, slightly barbed, 1.72-2.85 length of saddle along dorsal margin; 2-X with 2-3 branches; 3-X single; 4-X composed of 5-6 1/2 (usually 5) pairs of moderately long pectinate setae, precratal setae absent; anal papillae, moderately long, dorsal pair longer than ventral pair, length of dorsal pair about 1.66-2.86 length of saddle along dorsal margin.

TYPE DATA. The holotype male of *Aedes reinerti* (07850-4) has associated larval and pupal exuviae mounted on a slide with the following collection data: "THAILAND, 07850-4, Chiangmai, Doi Inthanon, 29 June 1978, Coll. B.A. Harrison." Slides associated with the holotype are larval and pupal exuviae, 07850-4, (slide number F.5650 and genitalia slide number S-3252). The allotype female, 07850-8 with associated larval and pupal exuviae (slide number F-5654) has the same data as the holotype. An additional 26 females, 32 males with associated larval and/or pupal exuviae and 25 whole larvae from collections 07850, 07861 and 07899 have been designated as paratypes. The paratypes have the same data as the holotype and allotype except as noted in the next paragraph.

The type locality of *Aedes reinerti* is near Namtok Siribhum on Doi Inthanon, Amphoe (District) Chom Thong, Bang Yang, Chiang Mai Province in northern Thailand. The type and paratype collections (07850, 07861 and 07899) were made, respectively, on Doi Inthanon in wild *Musa* (banana) axils on 29 June 1978 at 1,500 m elevation, Doi Pui in *Alocasia* axils on 30 June 1978 at 1,280 m elevation, and on Doi Inthanon in wild *Musa* axils on 4 July 1978 at 1,700 m elevation by the junior author and a team of collectors.

The holotype and allotype of *reinerti* listed above and the paratypes listed below are deposited (with associated slides) in the USNM: 07850-1 (m), 07850-2 (f), 07850-5 (m), 07850-6 (m), 07850-9 (f), 07850-10 (f), 07850-11 (f), 07850-13 (m), 07850-14 (f), 07850-15 (f), 07850-16 (f), 07850-17 (f), 07850-18 (f), 07850-19 (m), 07850-21 (m), 07850-22 (f), 07850-23 (f), 07850-24 (f), 07850-25 (m), 07850-27 (m), 07850 (13 whole larval slides, slide numbers F.5679-F.5688, F.5690-F.5691 and F.5758); 07899-1 (m), 07899-2 (m), 07899-3 (f), 07899-4 (m), 07899-5 (m), 07899-6 (m), 07899-7 (m), 07899-8 (m), 07899-9 (f), 07899-10 (m), 07899-11 (m), 07899-12 (m), 07899-13 (m), 07899-14 (m), 07899-18 (m), 07899-19 (f), 07899-20 (f), 07899-21 (m), 07899-22 (m), 07899-23 (f), 07899-24 (f), 07899-25 (m), 07899-26 (m), 07899-28 (f), 07899-29 (f), 07899-30 (m), 07899-32 (f), 07899-33 (m), and 07899 (8 whole larvae, slide numbers F.7075-F.7081 and F.7083).

Additional paratypes of *reinerti* are deposited as below. Three males (07861-27, 07899-15, & 07899-16) and 3 females (07850-26, 07861-15 & 07899-17) with associated larval and pupal exuviae on slides, plus 2 whole larval slides, 07850 (F.5689) and 07899 (F.7082) are deposited in the British Museum (Natural History). Two males (07850-7 & 07899-31) and 2 females (07850-20 & 07899-27) with associated larval and pupal exuviae on slides, plus 2 whole larval slides, 07850 (F.5692 and F.5693) are deposited in the Department of Medical Entomology, Armed Forces Research Institute of Medical Sciences, Bangkok, Thailand.

The 2 female syntypes of *Aedes formosensis* Yamada were examined in Tokyo by the senior author in 1985. One specimen was examined previously by Dr. Mercedes (Delfinado) Baker in 1960 and had been selected by her to be designated as the lectotype, but this selection was not published. This specimen is designated here as the lectotype for *Aedes formosensis* Yamada, 1921, and

bears the following label data: "Kappanzani, Formosa, 10-5-1921, S. Hirayama, lectotype MD 1960."

The holotype of *Aedes pallirostris* Edwards, 1922, and 2 syntypes (male and female) of *Finlaya khasiana* Barraud, 1923, were borrowed from the British Museum (NH) and examined by the junior author in 1984-85. The female holotype of *Aedes pallirostris* bears the following data on 5 labels: (1) "Type" on line 1, "H.T." on line 2; (2) "Khumtai" on line 1, "Golaghat" on line 2, "Assam" on line 3, "Febr. 1911" on line 4, "S.R. Christophers" on line 5, and "e. bamboo" on line 6; (3) "India:" on line 1, line 2 blank, line 3 blank, "Capt. P.J. Barraud" on line 4, and "B.M. 1923-207" on line 5; (4) "*Aedes*" on line 1, "*pallirostris* Edw." on line 2, "F.W. Edwards" on line 3, and "det. 1921" on line 4; and (5) "E.119" on line 1. The female syntype of *Finlaya khasiana* examined during this study is designated here as lectotype for this nominal species, and bears the following data on 2 labels: (1) " " on line 1, "*Finlaya*" on line 2, "*khasiana*" on line 3, and "Type" on line 4; and (2) "India" on line 1, "Shillong, Assam" on line 2, "VI.1922" on line 3, "Capt. P.J. Barraud" on line 4, and "B.M.1923-107 308" on line 5.

DISTRIBUTION. The known distribution of *Aedes reinerti* is restricted to 27 collections made between 1,280 and 2,143 m elevation on 4 mountains in Chiang Mai Province in northern Thailand. Actually, it is almost certain to have a much wider distribution in the western and northern regions of Thailand. The oviposition and immature habitats (see Bionomics) of this species, coupled with its occurrence in evergreen deciduous forests at certain elevations, suggest that it should have a much wider distribution, possibly including Burma, Lao People's Democratic Republic, People's Democratic Republic of China, and Vietnam. Possibly the "*Aedes* (*Finlaya*) close to *formosensis*" recorded by Ramachandra Rao et al. (1973) from Uttarkashi District of Uttar Pradesh State, India, represents *reinerti*. However, those specimens were not available for examination.

A total of 342 *reinerti* specimens including exuviae were examined during this study (45 males, 54 females, 79 larval skins, 77 whole larvae, 87 pupal skins, and 1 whole pupa). Data for these specimens are as follows: THAILAND. Chiang Mai Province. Chom Tong District, Doi Inthanon: Ban Khun Klang, Coll. CM-214, 20 Nov. 1963, banana axil, J.N., S.E. & O.B., 2 f, 3 p, 9 L; Coll. CM-224, 23 Nov. 1963, banana axil, J.N., S.E. & O.B., 3 f, 3 l, 1 P, 5 L; Namtok Siribhum, Coll. 07850, 29 Jun 1978, mixed banana axils, Harrison and team, 11 m, 18 f, 28 p, 25 l, 16 L; Coll. 07899, 4 Jul 1978, banana axil, Harrison and team, 22 m, 11 f, 33 p, 33 l, 9 L. Mae Taeng District, Doi Chom Chaeng (Jom Jaeng), Coll. CM-118, 25 Sept 63, bamboo stump, Sahem and team, 1 f. Muang District, Doi Pui: Coll. 07861, 30 Jun 1978, *Alocasia* axil, Ruan and Mee, 2 m, 4 f, 6 p, 4 l; Coll. 07862, 30 Jun 1978, banana stump, Kol, 3 m, 3 p, 2 l; Coll. 07863, 30 Jun 1978, banana axil, Sanit, 5 L. Muang District, Doi Sutep: Suan Kwin Nin, Coll. T-1138, 17 Apr 1962, man-biting 1800-2015 hr, Preecha, 1 f; Suan Kwin Nin, Coll. T-1397, 11 Jul 1962, *Alocasia* axil, Saham, 1 f; Suan Kwin Nin, Coll. T-1664, 11 Sep 1962, man-biting 1800-1900 hr, Keo, 3 f; Tham Pa Lard, Coll. T-1424, 13 Jul 1962, rockpool, Sahem, 3 L; Huey Lan Koo, Coll. T-1680, 4 Oct 1962, man-biting 0800-0900 hr, Keo, 1 f; Tham Khun Kan (km 10), Coll. T-1683, man-biting 1800-1900 hr., Sahem, 1 f;

Coll. T-2672, 7 Jun 1963, *Alocasia* axil, Keo, 1 f; Coll. Cm-1, 2 Aug 1963, banana axil, J.N. Belkin, 2 m, 4 f, 5 p, 5 l, 3 L; Coll. CM-3, 3 Aug 1963, *Alocasia* axil, S.E. & O.B., 1 f, 1 p, 1 l; Coll. CM-8, 3 Aug 1963, banana axil, Sahem Esah, 1 f; Coll. CM-10, 3 Aug 1963, banana axil, Scanlon & Belkin, 6 L; Coll. CM-12, 2[3?] Aug 1963, Scanlon, 1 f, 1 p, 1 l; Suan Mayaw, Coll. CM-132, 26 Sep 1963, tree hole, S.E. & O.B., 1 L; Huey Koak Ma, Coll. CM-136, 1 Oct 1963, banana [axil?], Sahem & team, 2 m, 2 p, 1 l, 14 L; Coll. CM-148, 4 Oct 1963, *Alocasia* [axil?], Sahem & O.B., 1 l, 4 L; Huey Kok Ma, Coll. CM-250, 19 Mar 1964, banana [axil?], J.E.S. & team, 1 L; Huey Kok Ma, Coll. CM-399, 15 Jun 1964, banana [axil?], Chiang Mai Team, 3 m, 4 p, 3 l. San Pa Tong District, Ban Ta Law, Coll CM-101, 13 Sep 1963, bamboo hole 10 ft high, Neely & O.B., 1 L.

TAXONOMIC DISCUSSION. As part of the process of examining over one thousand adults and immatures of *formosensis* from Thailand, Malaysia and several other countries in the Southeast Asia faunal region, we reexamined the type specimens of the 2 current synonyms of *formosensis*, *Aedes pallirostris* Edwards and *Finlaya khasiana* Barraud, to see if either were identical with the northern Thai specimens and therefore, have name priority. Both of these nominal taxa are correctly assigned as synonyms of *formosensis*. Knight (1968) was very astute in assigning *pallirostris* as a synonym of *formosensis*. While most *formosensis* have a proboscis with a small ventral patch like those on *khasiana*, in northern Thailand, Vietnam, and India (Assam), specimens are frequently encountered with more extensive pale scaling on the proboscis as described for *pallirostris* where pale scales may occur on the dorsum of the middle part of the proboscis and nearly to the apex on the venter of the proboscis. Regardless of these variations, the holotype of *pallirostris* and the lectotype of *khasiana* both possess the white scales on the paratergite and subspiracular area as found on both *formosensis* and *reinerti*. However, the other characters on these 2 synonyms conform to *formosensis*, i.e., midfemur without anterior longitudinal pale stripe extending much beyond middle and mid- and hindtibia anterior basal white stripes short. In addition, the types of *pallirostris* and *khasiana* possess a small lower-posterior patch of broad silvery gray scales on the postpronotum, identical to that occurring on *formosensis*.

Based on the midfemur character listed in Knight (1948), Knight and Marks (1952) and Knight (1968), *Ae. reinerti* keys out to Group E (Mediovittatus Group) of *Aedes* (*Finlaya*) in Knight and Marks (1952). However, all of the other characters listed in these publications indicate that the midfemur character should be disregarded, and that *reinerti* actually belongs to the *Chrysolineatus* Subgroup of Group D (Aureostriatus Group). In fact, Knight and Marks (1952, in a footnote p. 519) mentioned that *Ae. quasirubithorax* (Theobald) also could exhibit anterior longitudinal lines on the midtibia and midfemur. Thus, *reinerti* is the second species in the *Aureostriatus* Group with an abnormally striped midfemur. The *Chrysolineatus* Subgroup presently includes 12 species; *chrysolineatus* (Theobald), *formosensis*, *harveyi* (Barraud), *japonicus* (Theobald)-complex, *jugraensis* (Leicester), *koreicus* (Edwards), *koreicoides* Sasa, Kano, and Hayashi, *nigrorhynchus* Brug, *reinerti*, *rizali* (Banks), *saxicola* Edwards and *sherki* Knight.

In a more recent classification of *Aedes chrysolineatus* and related species (Meng 1981), *reinerti* does not key clearly to, but actually belongs in the Chrysolineatus Group of the Tenuipalpus Series in the Chrysolineatus Section. Again, as in the Knight and Marks (1952) classification above, the anterior longitudinal pale midfemur stripe on *reinerti* does not conform to the femur character ascribed by Meng to the Chrysolineatus Group of the Tenuipalpus Series. However, the male palpi of *reinerti* clearly show the characters first noted by Knight (1948) and now ascribed by Meng (1981) to the Chrysolineatus Group of the Tenuipalpus Series. Using the Meng (1981) classification there are presently 11 species in the Chrysolineatus Group: *chrysolineatus*, *formosensis*, *harveyi*, *japonicus* complex, *jugraensis*, *koreicus*, *nigrorhynchus*, *reinerti*, *rizali*, *saxicola*, and *sherki*. Why Meng did not include *koreicoides* in the group was not explained.

Aedes reinerti clearly has closest affinities with *Ae. formosensis*, and quickly keys to that species in Knight (1968). Both species possess pale paratergal scales which Knight (1968:12) stated was a character unique to *formosensis* in the Chrysolineatus Subgroup. In addition, both species have an exceptionally high number of branches on larval seta 5-C and both usually have a patch of pale subspiracular scales on the adult. Despite these similarities and particularly the absence of good male genitalia differences, we feel strongly that *reinerti* deserves species recognition based on the diagnostic morphological characters for the adult, pupal and larval stages listed in Table 1. Additional evidence supporting species recognition for *reinerti* is the common occurrence of *reinerti* and *formosensis* immatures together in the same *Musa* and *Alocasia* axils, without any morphological evidence for hybridization. Using the species and subspecies definitions of Mayr (1963, 1969), sympatry eliminates the possibility that *reinerti* could be a subspecies of *formosensis*. Other evidence is found in the stability of the morphological characters found on *reinerti* specimens collected on several widely separated mountains in Chiang Mai Province over a 15 year period.

We take great pleasure in naming this species *reinerti* in honor of our friend, Dr. John F. Reinert, in recognition of his many excellent taxonomic publications on the genus *Aedes*.

BIONOMICS. Based on data from 27 separate collections between 1962 and 1978, *Ae. reinerti* is clearly a montane species with oviposition preferences for plant axil habitats. Collections of *reinerti* have been made on 4 separate mountain peaks (Doi Inthanon, Doi Chom Chaeng, Doi Pui and Doi Sutep) at elevations between 1,280 and 2,143 m (4,181 to 7,000 ft). Immature habitats were always located in partial to heavy shade in secondary evergreen deciduous forest. Twenty-two immature collections were made from the following habitats: *Musa* (banana) axils (11), *Alocasia* axils (5), tree holes (2), *Musa* (banana) stump (1), bamboo stump (1), bamboo hole 3 meters above ground (1), and rockpool (1). Accordingly, 73% (16/22) of the immature collections came from plant axil habitats, with banana axils the primary source. Other mosquito species associated with *Ae. reinerti* in these immature collections were: *Ae. (Fin.) assamensis*

(Theobald), *Ae. (Fin.) aureostriatus* (Doleschall), *Ae. (Fin.) dissimilis* (Leicester), *Ae. (Fin.) formosensis*, *Ae. (Fin.) harveyi*, *Ae. (Fin.) saxicola*, *Ae. (Stg.) albopictus* (Skuse), *Armigeres (Arm.) subalbatus* (Coquillett), *Ar. (Lei.) magnus* (Theobald), *Culex (Eum.) brevipalpis* (Theobald), *Cx. (Lop.) minor* (Leicester), *Cx. (Lop.) peytoni* Bram and Rattanarithikul, *Cx. (Lop.) spiculosus* Bram and Rattanarithikul, *Heizmannia (Hez.) reidi* Mattingly, *Orthopodomyia anopheloides* (Giles), *Topomyia (Sua.) nr. cristata* Thurman, *To. (Top.) nr. inclinata* Thurman, *To. (Top.) nr. unispinosa* Thurman, *Tripteroides (Rac.) aranoides* (Theobald), *Trp. (Trp.) powelli* (Ludlow), and *Uranotaenia (Pfc.) novobscura* Barraud.

Little is known about the adult behavior of *Ae. reinerti*, as most collections were of immatures. Adult females were captured biting humans in 5 different collections between 0800-0900 hr and 1800-2015 hr. In each case biting occurred in dense shaded forest. The relationship of this species to the transmission of human pathogens is unknown.

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Table 1. Adult, pupal and larval characters to differentiate *Aedes reinerti*.

Character	<i>reinerti</i>	<i>formosensis</i>
ADULT		
Proboscis ventral pale f scales m	basal 0.05-1.0 basal 0.45-1.0	basal 0.05-0.80 basal 0.05-0.60
Midfemur anterior longitudinal white stripe	basal 0.05-1.0	basal 0.50-0.60
Midtibia anterior white stripe	basal 0.24-0.40 (mode 0.29)	basal 0.11-0.20 (mode 0.13)
Hindtibia anterior white stripe	basal 0.25-0.40 (mode 0.32)	basal 0.13-0.22 (mode 0.18)
PUPA		
1-I basal branches	4-12 (mode 7)	8-24 (mode 12)
5-VI length compared to succeeding segment	short, 0.61 or less (mode 0.45)	long, 0.61 or more (mode 0.83)
5-VII length compared to succeeding segment	short, 0.67 or less (mode 0.44)	long, 0.64 or more (mode 0.88)
1-P length compared to paddle	short, 0.17-0.36 (mode 0.20)	long, 0.27-0.40 (mode 0.38)
LARVA		
1-C shape and size	long, very stout, usually bifid on basal 0.16-0.46, each branch with long fine barbs or brushy	short, single slender and tapering beyond 0.50
5-C branches	17-34 (mode 25)	8-17 (mode 12)
Pecten teeth	simple or with fine denticles on basal 0.50	most with denticles
1-X length compared with saddle	long, 1.72-2.85 (mode 2.28)	short, 1.25-1.92 (mode 1.50)

Table 2. Number of branches for pupal setae of *Aedes (Finlaya) reinerti*^a.

Seta Number	CT	Abdominal Segments										Paddle	
		I	II	III	IV	V	VI	VII	VIII	IX	P		
0	-	-	1	1	1	1	1	1	1	-	-	-	-
1	1-3(1)	4-12(7)	3-6(3)	2-4(3)	2-4(4)	2-4(2)	1,2(2)	1,2(1)	-	-	1	-	1
2	1,2(2)	1	1	1	1	1,2(1)	1	1	-	-	-	-	-
3	1-3(1)	1	1	1	1-5(4)	1-3(3)	1,2(1)	1-3(1)	-	-	-	-	-
4	1-7(4)	2-5(4)	3-6(4)	2-5(3)	3-5(3)	2-6(4)	2-6(3)	1-4(2)	1-3(2)	-	-	-	-
5	1-8(2)	1-6(2)	1,2(1)	1,2(1)	1	1	1	1	-	-	-	-	-
6	1,2(1)	1,2(2)	1-3(1)	1-4(2)	2-4(2)	1,2(2)	1,2(2)	1-3(2)	-	-	-	-	-
7	1-3(1)	1,2(2)	1-4(3)	1-6(4)	1-4(3)	2-5(3)	1-3(2)	1	-	-	-	-	-
8	1-5(3)	-	1-3(1)	3-5(4)	2-5(3)	2-5(4)	2-6(4)	1-3(2)	-	-	-	-	-
9	1-3(2)	1	1	1	1	1	1	3-8(5)	6-13(11)	-	-	-	-
10	1-5(2)	1	1,2(1)	1-3(2)	1-3(2)	1,2(1)	1,2(1)	1,2(1)	-	-	-	-	-
11	1	1	1	1	1	1	1	1	-	-	-	-	-
12	1-3(2)	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-	-
14	-	-	1	1	1	1	1	1	1	-	-	-	-

^a. Minimum 20 checked for each seta.

Table 3. Number of branches for fourth-instar larval setae of *Aedes (Finlaya) reinerti*^a.

Seta Number	Head C	Thorax		Abdominal Segments								VII	VIII	X
		P	M	T	I	II	III	IV	V	VI				
0	-	5-8(5)	-	-	-	1	1	1	1	1	1	1	1	-
1	1	2-4(3)	2-7(4)	2-5(3)	3-8(5)	2-5(4)	2-5(4)	4-5(4)	3-5(3)	3-4(3)	2-4(3)	2,3(3)	2,3(3)	1
2	-	1	2	1,2(1)	1,2(1)	1,2(1)	1,2(1)	1,2(1)	1,2(1)	1,2(1)	1	1	1	2,3(2)
3	-	9-16(13)	1	2,3(2)	1	1	1	1	1	1	2-4(2)	6-9(9)	6-9(9)	1
4	3-10(6)	1,2(1)	1,2(1)	2-4(3)	2-4(3)	1-4(2)	1-3(2)	2,3(2)	1-3(2)	1	1-3(1)	1	5,6	1/2(5)
5	17-34(25)	2	1	1	2-7(5)	4-6(4)	2-6(3)	2-4(2)	2,3(2)	2,3(2)	2-4(2)	2-4(4)	2-4(4)	-
6	6-16(11)	1	3-7(5)	1	2	2	2,3(3)	2,3(3)	2,3(3)	2,3(3)	2-4(2)	2-4(2)	2-4(2)	-
7	4-7(5)	2,3(2)	1	4-10(8)	1	1,2(2)	1-3(2)	1-3(2)	1,2(2)	1,2(2)	1	1-S	1-3(2)	1-3(2)
8	1	2-4(2)	5-9(8)	3-5(4)	-	1,2(2)	1	1	1,2(1)	1-3(2)	2-5(2)	-	-	-
9	2	1	3-5(4)	2,3(3)	2,3(2)	1,2(1)	1	1	1	1,2(1)	1,2(2)	-	-	-
10	1	1	1	1	1	1	1	1	1	1	1	-	-	-
11	5-13(8)	2,3(2)	1	1	2-6(5)	1,1,2(1)	1,2(1)	1,2(1)	1	1,2(1)	1	-	-	-
12	1,2(1)	1	1	1	1,2(1)	1-3(2)	1-3(2)	1-3(2)	1,2(1)	1,2(1)	1	-	-	-
13	1,2(1)	-	1-6(3)	3-6(3)	4-6(5)	2-6(3)	2,3(2)	2-4(3)	2-4(4)	3-7(4)	1	-	-	-
14	1,2(1)	2-4(2)	2-11(6)	-	-	1	1	1	1	1	1	1	1	-
15	2-6(3)	-	-	-	-	-	-	-	-	-	-	-	-	-

a. Minimum 20 checked for each seta.

Abbreviations used in Figures 1-5

A	- antenna
Ae	- aedeagus
AGDB	- accessory gland duct base
BMA	- basal median apodeme
BP	- basal piece
C	- cranium
Ce	- cercus
CF	- claspette filament
Cl	- claspette
CS	- comb scale
CSe	- cercal setae
CSt	- claspette stem
CT	- cephalothorax
Dm	- dorsomentum
Gc	- gonocoxite
GC	- gonostylar claw
Gs	- gonostylus
I	- insula
LVL	- lower vaginal lip
M	- mesothorax
p	- puncture
P	- paddle, prothorax
Par	- paramere
PGL	- postgenital lobe
PH	- phallosome
Ppr	- paraproct
PS	- pecten spine
PT	- pecten teeth
rs	- rudimentary spine
S	- siphon
Sa	- saddle
SCa	- spermathecal capsule
T	- metathorax
UVL	- upper vaginal lip
1-C	- head seta 1
1-I	- abdominal segments
IX-Te	- tergum IX
IX-TL	- tergum IX lobe
IX-S	- sternum IX
X-Te	- tergum X

Fig. I

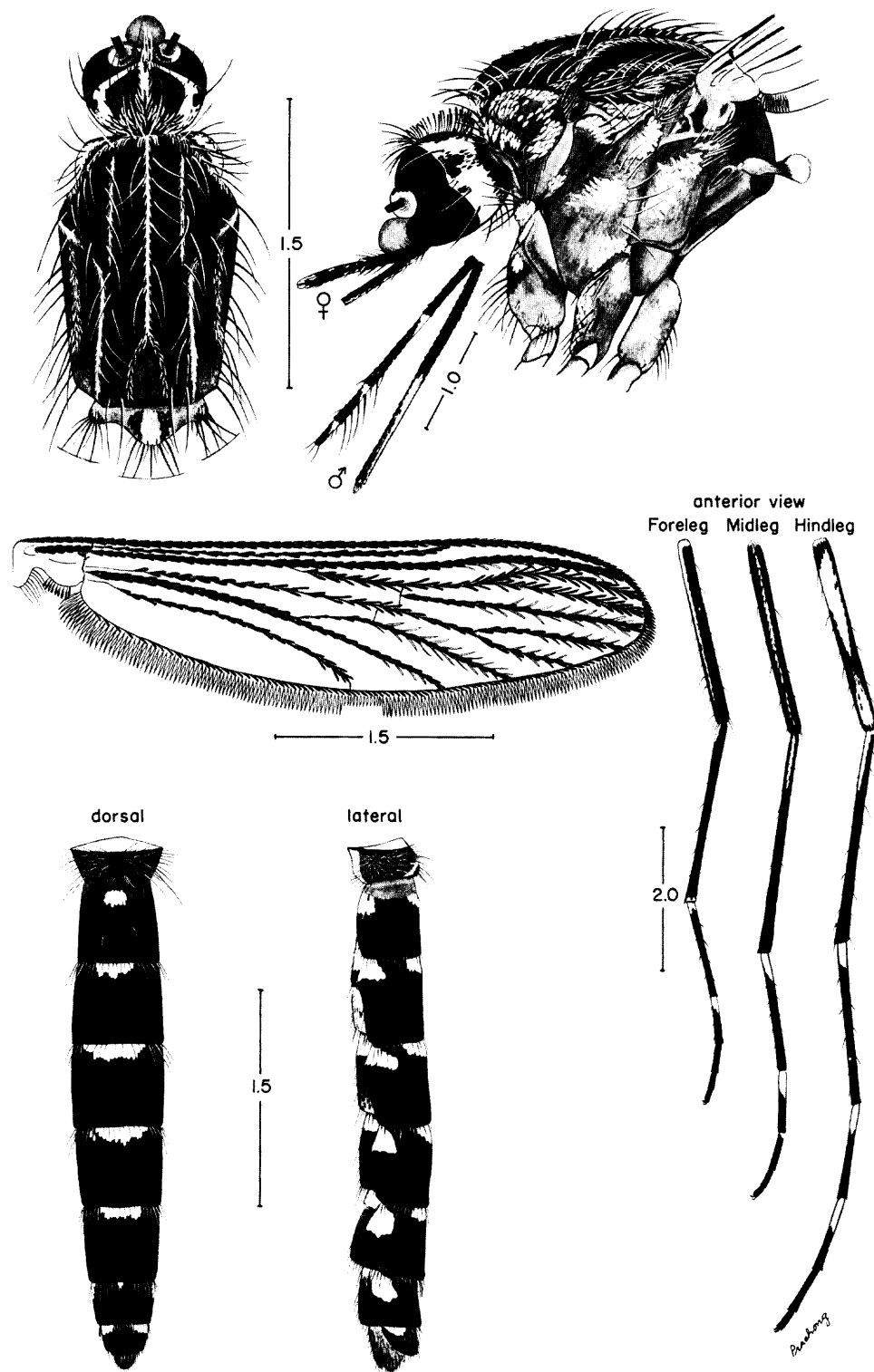
***Aedes (Fin.) reinerti***

Fig. 2

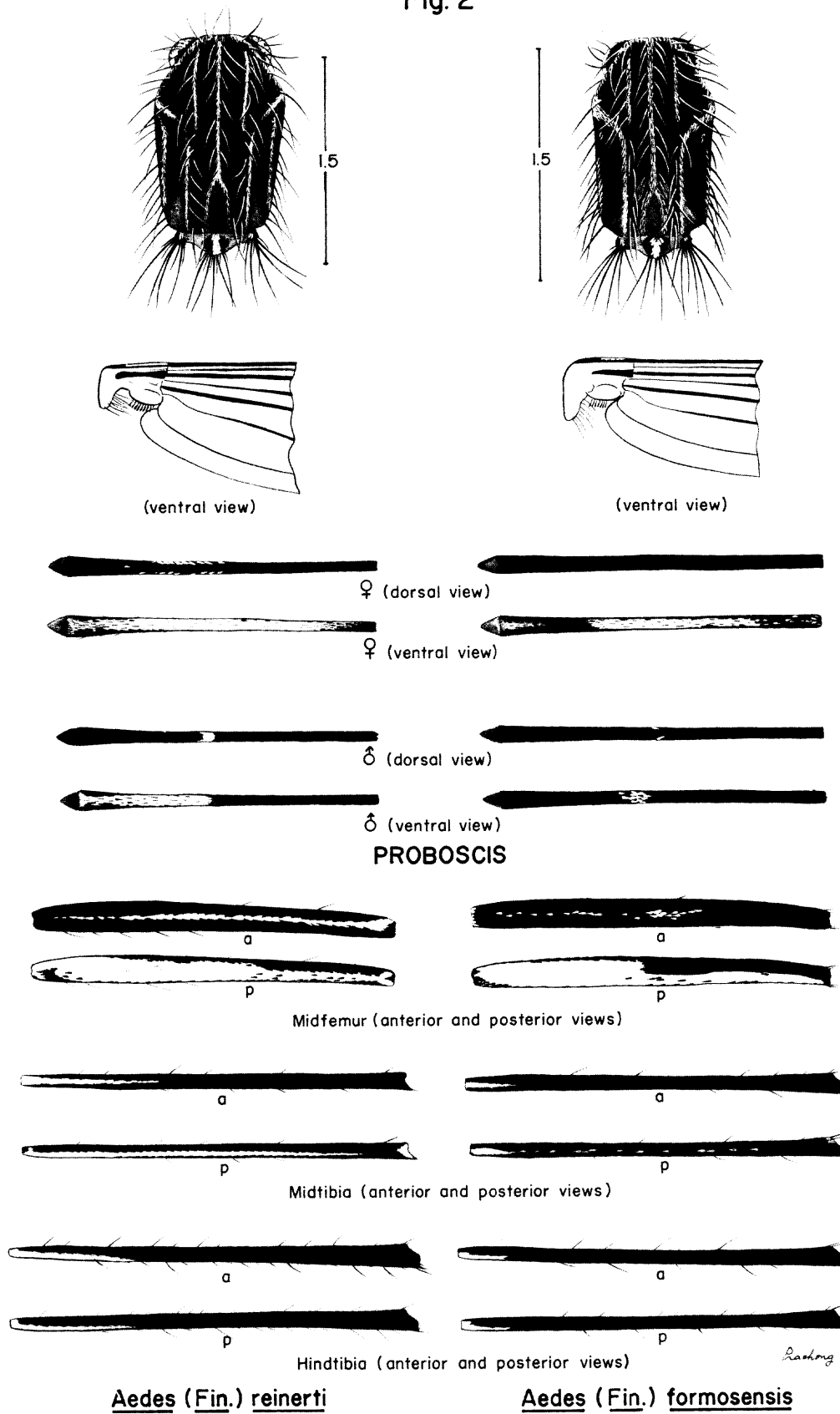
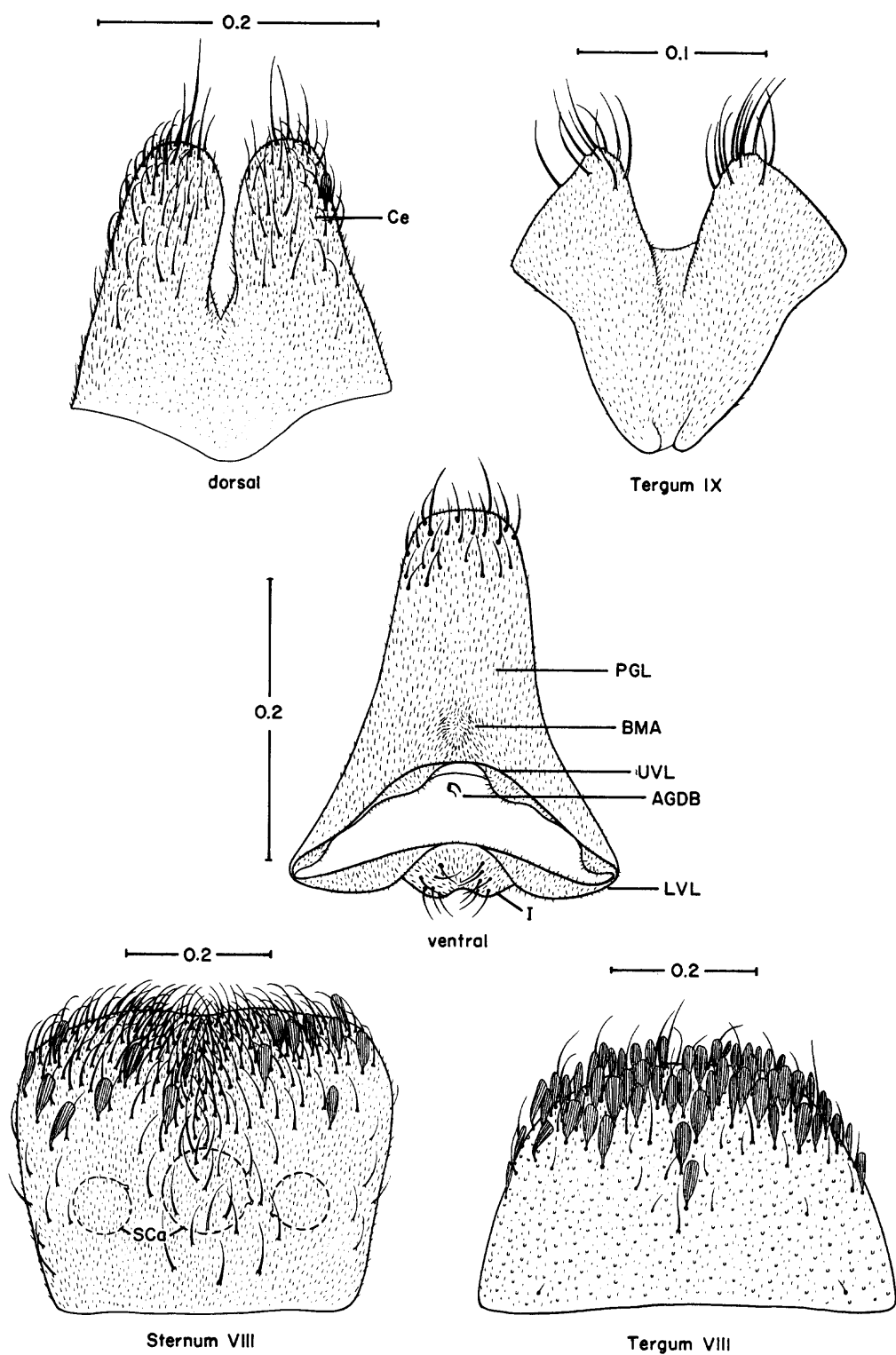


Fig. 3



Aedes (Fin.) reinerti

Fig. 4

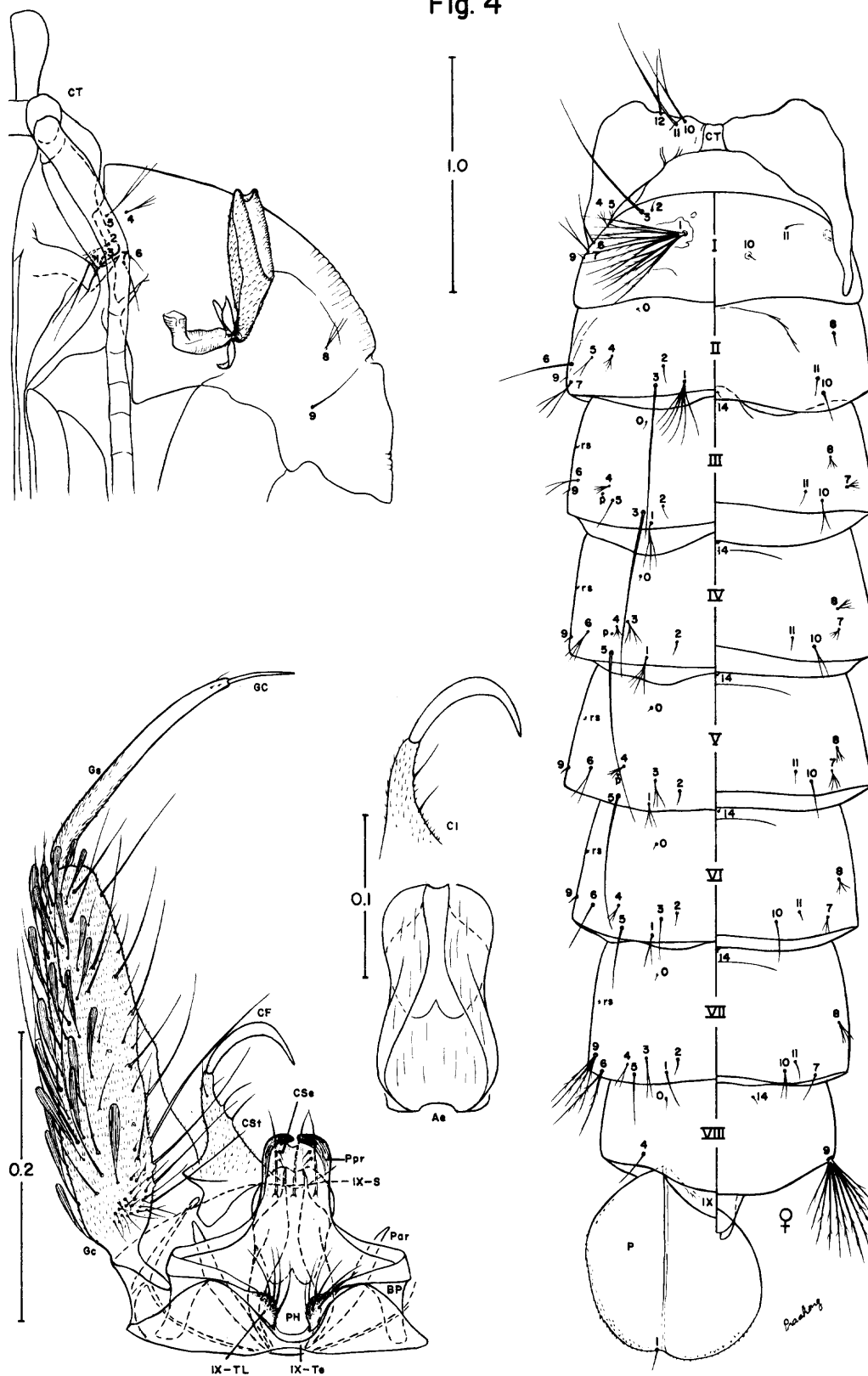
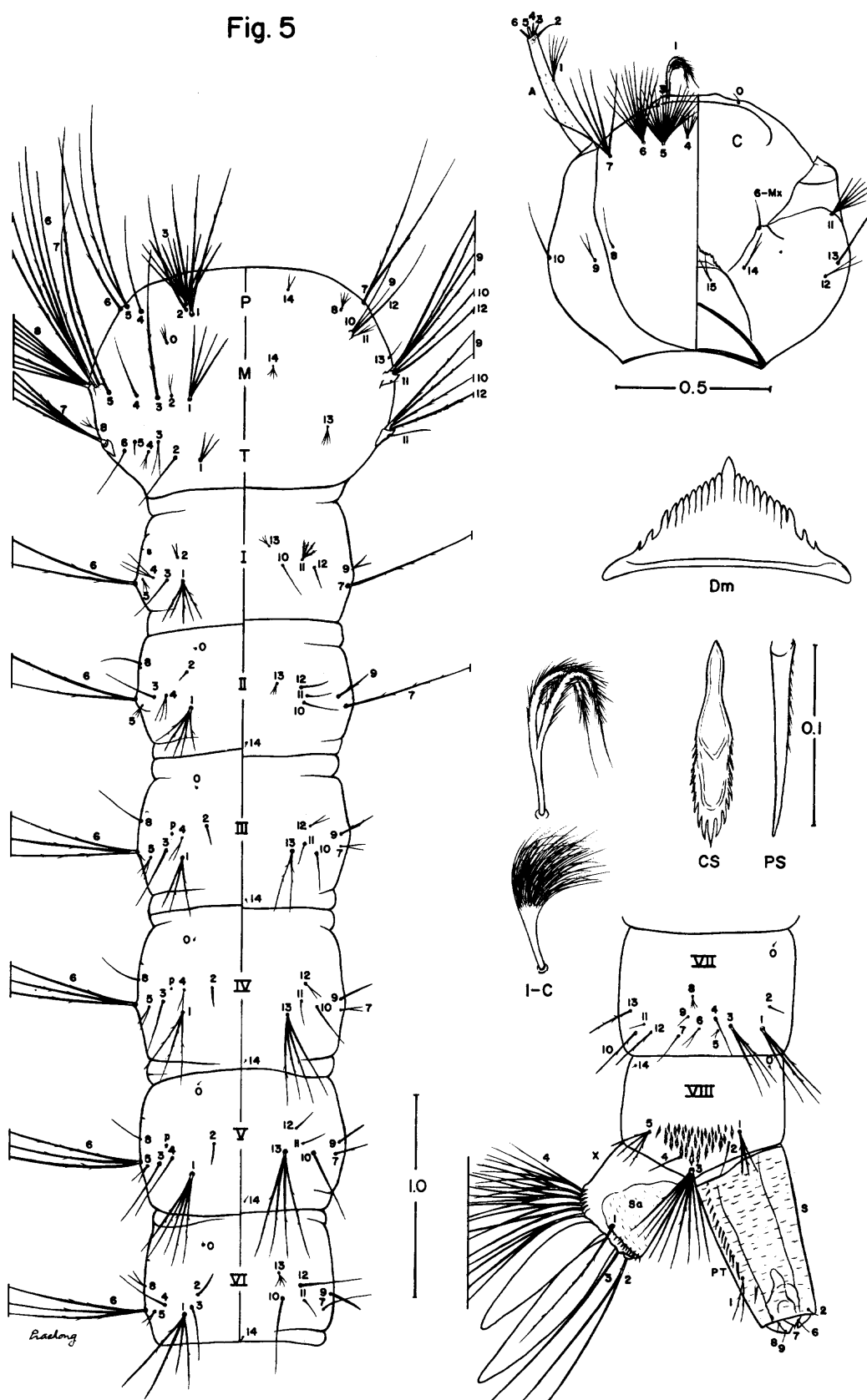
***Aedes (Fin.) reinerti***

Fig. 5

***Aedes (Fin.) reinerti***